

Pressure Ulcer Bibliography

16

Ayello EA and Sibbald RG. Preventing pressure ulcers and skin tears. 2012 [cited 2016 Feb 09]; Available from: <http://www.guideline.gov/content.aspx?f=rss&id=43935>

9

Beeckman D, Matheï C, Van Lancker A, Van Houdt S, Vanwalleghem G, Gryson L and et al. A National Guideline for the prevention of pressure ulcers. Good Clinical Practice (GCP). 2013 [cited 2016 Feb 09]; Available from: https://kce.fgov.be/sites/default/files/page_documents/KCE_193C_prevention_pressure_ulcers_0.pdf

7

Beeckman D, Matheï C, Van Lancker A, Vanwalleghem G, Van Houdt S, Gryson L and et al. A national guideline for the treatment of pressure ulcers. Good Clinical Practice (GCP). 2013 [cited 2016 Feb 09]; Available from: https://kce.fgov.be/sites/default/files/page_documents/KCE_203_pressure_ulcers.pdf

52

Benoit R and Mion L. Risk factors for pressure ulcer development in critically ill patients: A conceptual model to guide research. Research in Nursing & Health. 2012;35(4):340-362 23p.

This paper presents a proposed conceptual model to guide research on pressure ulcer risk in critically ill patients, who are at high risk for pressure ulcer development. However, no conceptual model exists that guides risk assessment in this population. Results from a review of prospective studies were evaluated for design quality and level of statistical reporting. Multivariate findings from studies having high or medium design quality by the National Institute of Health and Clinical Excellence standards were conceptually grouped. The conceptual groupings were integrated into Braden and Bergstrom's (Braden and Bergstrom [1987] Rehabilitation Nursing, 12, 8-12, 16) conceptual model, retaining their original constructs and augmenting their concept of intrinsic factors for tissue tolerance. The model could enhance consistency in research on pressure ulcer risk factors. © 2012 Wiley Periodicals, Inc. Res Nurs Health 35:340-362, 2012.

40

Bernabe KQ. Pressure ulcers in the pediatric patient. Current Opinion in Pediatrics. 2012;24(3):352-6.

PURPOSE OF REVIEW: In contrast to adult literature, data for pressure ulcers in children is limited. Incidence and prevalence of this skin integrity issue in pediatric hospitals is still widely unknown, perhaps because increased awareness and prevention of the phenomenon have been slow to develop. Moreover, identification of at-risk patients is lacking, and current guidelines and interventions to prevent skin breakdown are those that have been adapted from adult care and are not supported by evidence-based data in children.

RECENT FINDINGS: Awareness and prevention of pressure ulcers in the pediatric acute care setting are becoming a priority. In 2008, the Centers for Medicare and Medicaid Services listed certain hospital acquired conditions for which facilities would no longer be additionally reimbursed. A pressure ulcer, stage III or higher, is included in that list and referred to as a 'never event' as it is a condition that could be reasonably prevented by use of evidence-based guidelines.

SUMMARY: Pediatric pressure ulcers are a serious and largely preventable condition. Increased awareness, and accurate and timely assessment to recognize at-risk children, can lead to pressure ulcer prevention. More studies are needed to better define risk factors and effective prevention of pediatric pressure ulcers.

29

Canadian Agency for Drugs and Technologies in Health (CADTH). Dressing Materials for the Treatment of Pressure Ulcers in Patients in Long-Term Care Facilities: A Review of the Comparative Clinical Effectiveness and Guidelines. 2013 [cited 2016 Feb 10]; Available from:

<https://www.cadth.ca/media/pdf/htis/dec-2013/RC0496%20Pressure%20Ulcer%20Care-Final.pdf>

30

Canadian Agency for Drugs and Technologies in Health (CADTH). Patient lifts and transfer equipment for preventing pressure ulcers: a review of clinical and cost-effectiveness and guidelines. 2013 [cited 2016 Feb 10]; Available from:

<https://www.cadth.ca/media/pdf/htis/apr-2013/RC0439%20Lift%20Devices%20for%20Turning%20Report%20Final.pdf>

31

Canadian Agency for Drugs and Technologies in Health (CADTH). Natural Sheepskins for the Treatment of Pressure Ulcers: Clinical Effectiveness, Cost-Effectiveness, and Guidelines. 2014 [cited 2016 Feb 10]; Available from:

<https://www.cadth.ca/media/pdf/htis/dec-2014/RB0728%20Australian%20Sheepskin%20for%20Ulcers%20Update%20Final.pdf>

34

Centre for Reviews and Dissemination. Preventing pressure ulcers. 2014 [cited 2016 Feb 10]; Available from:

<http://www.york.ac.uk/media/crd/effectiveness-matters-Oct-2014-pressure%20ulcers.pdf>

32

Chou R, Dana T, Bougatsos C, Blazina I, Starmer A, Reitel K and et al. Pressure Ulcer Risk Assessment and Prevention: Comparative Effectiveness. 2013 [cited 2016 Feb 10]; Available from:

<http://www.effectivehealthcare.ahrq.gov/ehc/products/309/1489/pressure-ulcer-prevention-report-130528.pdf>

46

Chou R, Dana T, Bougatsos C, Blazina I, Starmer AJ, Reitel K and Buckley DI. Pressure ulcer risk assessment and prevention: A systematic comparative effectiveness review. *Annals of Internal Medicine*. 2013;159(1):28-38.

Background: Pressure ulcers are associated with substantial health burdens but may be preventable. Purpose: To review the clinical utility of pressure ulcer risk assessment instruments and the comparative effectiveness of preventive interventions in persons at higher risk. Data Sources: MEDLINE (1946 through November 2012), CINAHL, the Cochrane Library, grant databases, clinical trial registries, and reference lists. Study Selection: Randomized trials and observational studies on effects of using risk assessment on clinical outcomes and randomized trials of preventive interventions on clinical outcomes. Data Extraction: Multiple investigators abstracted and checked study details and quality using predefined criteria. Data Synthesis: One good-quality trial found no evidence that use of a pressure ulcer risk assessment instrument, with or without a protocolized intervention strategy based on assessed risk, reduces risk for incident pressure ulcers compared with less standardized risk assessment based on nurses' clinical judgment. In higher-risk populations, 1 good-quality and 4 fair-quality randomized trials found that more advanced static support surfaces were associated with lower risk for pressure ulcers compared with standard mattresses (relative risk range, 0.20 to 0.60). Evidence on the effectiveness of low-air-loss and alternating-air mattresses was limited, with some trials showing no clear differences from advanced static support surfaces. Evidence on the effectiveness of nutritional supplementation,

repositioning, and skin care interventions versus usual care was limited and had methodological shortcomings, precluding strong conclusions. Limitation: Only English-language articles were included, publication bias could not be formally assessed, and most studies had methodological shortcomings. Conclusion: More advanced static support surfaces are more effective than standard mattresses for preventing ulcers in higher-risk populations. The effectiveness of formal risk assessment instruments and associated intervention protocols compared with less standardized assessment methods and the effectiveness of other preventive interventions compared with usual care have not been clearly established. © 2013 American College of Physicians.

49

Cox J and Rasmussen L. Enteral Nutrition in the Prevention and Treatment of Pressure Ulcers in Adult Critical Care Patients. Critical Care Nurse. 2014;34(6):15-27 13p.

Prevention and healing of pressure ulcers in critically ill patients can be especially challenging because of the patients' burden of illness and degree of physiological compromise. Providing adequate nutrition may help halt the development or worsening of pressure ulcers. Optimization of nutrition can be considered an essential ingredient in prevention and healing of pressure ulcers. Understanding malnutrition in critical care patients, the effect of nutrition on wound healing, and the application of evidence-based nutritional guidelines are important aspects for patients at high risk for pressure ulcers. Appropriate screenings for nutritional status and risk for pressure ulcers, early collaboration with a registered dietician, and administration of appropriate feeding formulations and micronutrient and macronutrient supplementation to promote wound healing are practical solutions to improve the nutritional status of critical care patients. Use of nutritional management and enteral feeding protocols may provide vital elements to augment nutrition and ultimately result in improved clinical outcomes.

60

Cullen Gill E. Reducing hospital acquired pressure ulcers in intensive care. 2015 [cited 2016 Feb 11]; Available from: <http://qir.bmj.com/content/4/1/u205599.w3015.full.pdf+html?sid=e461059a-c194-42b7-baa8-d751dcace58c>

54

Department of Health. Pressure ulcers: productivity calculator. 2010 [cited 2016 Feb 11]; Available from: <https://www.gov.uk/government/publications/pressure-ulcers-productivity-calculator>

39

Gadd MM. Preventing hospital-acquired pressure ulcers: improving quality of outcomes by placing emphasis on the Braden subscale scores. Journal of Wound, Ostomy, & Continence Nursing. 2012;39(3):292-4.

48

Gray S and Hampton S. A united approach to the prevention of pressure ulcers. Nursing & Residential Care. 2015;17(3):137-142 6p.

38

Gupta S and Ichioka S. Optimal use of negative pressure wound therapy in treating pressure ulcers. International Wound Journal. 2012;9 Suppl 1(8-16).

Pressure ulcers (PrUs) are a challenging health concern for both the clinician and the patient. The exact incidence and prevalence of PrUs varies widely among specific clinical populations, from 0.4% to 38% in acute care, from 2.2% to 24% in long-term care and from 0% to 17% in home care. The economic impact

of these wounds is impressive with an estimated cost of \$11 to \$17.2 billion annually in the USA. Guidelines from the National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel have provided recommendations for the prevention and treatment of PrUs. Negative pressure wound therapy with reticulated open cell foam (NPWT/ROCF; V.A.C. Therapy, KCI USA, Inc. San Antonio, TX) has been successfully used for managing PrUs. This review combines expert opinion with scientific evidence to describe the use of NPWT/ROCF in patients with PrUs. Copyright © 2012 The Authors. International Wound Journal © 2012 Blackwell Publishing Ltd and Medicalhelplines.com Inc.

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Ham W, Schoonhoven L, Schuurmans MJ and Leenen LPH. Pressure ulcers from spinal immobilization in trauma patients: A systematic review. Journal of Trauma and Acute Care Surgery. 2014;76(4):1131-1141.

Background: To protect the (possibly) injured spine, trauma patients are immobilized on backboard or vacuum mattress, with a cervical collar, lateral headblocks, and straps. Several studies identified pressure ulcer (PU) development from these devices. The aim of this literature study was to gain insight into the occurrence and development of PUs, the risk factors, and the possible interventions to prevent PUs related to spinal immobilization with devices in adult trauma patients. Methods: We systematically searched PubMed (MEDLINE), EMBASE, Cochrane, and CINAHL for the period 1970 to September 2011. Studies were included if participants were healthy volunteers under spinal immobilization or trauma patients under spinal immobilization until spine injuries were diagnosed or excluded. Outcomes of primary interest included occurrence, severity, and risk for PU development as well as prevention of PU development related to spinal immobilization devices. Results: The results of included studies show an incidence of collar-related PUs ranging from 6.8% to 38%. Described locations are the occiput, chin, shoulders, and back. The severity of these PUs varies between Stages 1 and 3, and one study describes PUs requiring surgical debridement, indicating a Stage 4 PU. Described risk factors for PU development are high pressure and pain from immobilizing devices, the length of time in/on a device, intensive care unit admission, high Injury Severity Scores (ISSs), mechanical ventilation, and intracranial pressure monitoring. Preventive interventions for collar-related PUs include early replacement of the extrication collar and regular skin assessment, collar refit, and position change. Conclusion: The results from this systematic review show that immobilization with devices increases the risk for PU development. This risk is demonstrated in nine experimental studies with healthy volunteers and in four clinical studies. LEVEL OF EVIDENCE: Systematic review, level III. © 2014 2014 Lippincott Williams & Wilkins.

2

Healthcare Improvement Scotland. Pressure ulcers standards. 2015 [cited 2016 Feb 09]; Available from: http://www.healthcareimprovementscotland.org/our_work/patient_safety/tissue_viability_resources/pressure_ulcer_standards.aspx

17

Institute for Clinical Systems Improvement (ICSI). Pressure ulcer prevention and treatment protocol. Health care protocol. 2012 [cited 2016 Feb 09]; Available from: <http://www.guideline.gov/content.aspx?f=rss&id=36059>

3

Institute for Healthcare Improvement. How-to Guide: Prevent Pressure Ulcers. 2011 [cited 2016 Feb 09]; Available from: <http://www.ihl.org/resources/Pages/Tools/HowtoGuidePreventPressureUlcers.aspx>

58

Institute for healthcare Improvement. Pressure Ulcer Plan of Care Tool. 2011 [cited 2016 Feb 11]; Available from: <http://www.ihi.org/resources/Pages/Tools/PressureUlcerPlanofCareTool.aspx>

43

Marchione FG, Araujo LMQ and Araujo LV. Approaches that use software to support the prevention of pressure ulcer: A systematic review. International Journal of Medical Informatics. 2015;84(10):725-736.

Context: The incidence and costs for pressure ulcer (PU) treatment remain high even though preventive methods are applied. Approaches that use software to support the prevention of PU are presented in the literature to make it more effective. Objectives: Identify the state of art of the approaches that use software to support the prevention of PUs. Methods: A systematic literature review was performed to analyze approaches that use software to support the prevention of PU. ACM, IEEE, PubMed, Scopus, CINAHL and Embase databases have been searched with a predetermined search string to identify primary studies. We selected the ones that met the established inclusion criteria. Results: Thirty-six articles met the inclusion criteria. To support prevention, most approaches monitor the patient to provide information about exposure to pressure, temperature level, humidity level and estimated body position in bed providing risk factor intensity charts and intensity maps. The main method to perform patient's monitoring is using sensors installed on the mattress, but recently, alternative methods have been proposed such as electronic sensors and tactile sensory coils. Part of the approaches performs automated management of the risk factors using ventilation tubes and mattresses with porous cells to decrease body's temperature and movable cells to automatically redistribute the pressure over the body. Matters as cost of the approach, patient comfort and hygiene of the monitoring equipment is only briefly discussed in the selected articles. No experiments have been conducted to evidence the approached may reduce PU incidence. Discussion and conclusion: Currently, approaches that use software to support the prevention of PU provide relevant information to health professionals such as risk factor intensity charts and intensity maps. Some of them can even automatically manage risk factors in a limited way. Yet, the approaches are based on risk factor monitoring methods that require patient's contact with the monitoring equipment. Therefore, some matters need to be considered such as patient's comfort and the hygiene or replacement of the equipment due to the risk of infection. With the emergence of new alternative methods of monitoring, new technologies that do not require contact could be explored by new researches. Randomized Control Trials could also be conducted to verify which approaches are really effective to reduce PU incidence.

35

Marin J, Nixon J and Gorecki C. A systematic review of risk factors for the development and recurrence of pressure ulcers in people with spinal cord injuries. Spinal Cord. 2013;51(7):522-7.

STUDY DESIGN: A systematic review was undertaken, based upon methods recommended for effectiveness questions but adapted to identify observational risk factor (RF) studies.

OBJECTIVES: The literature identifies many RFs for pressure ulcer (PU) recurrence and development; however, RFs independently predictive of PU development in adults with spinal cord injury (SCI) have not been determined. A systematic review was undertaken to identify RFs for PUs for people with SCI.

SETTING: Acute hospital, community and rehabilitation settings.

METHODS: Electronic searches of MEDLINE, Embase and Cochrane databases from 1980 to 2011 were completed. Retrieved studies were assessed for eligibility and quality criteria applied by two independent reviewers. Identified RFs were categorised into themes and compared and contrasted with RFs identified for the general PU population.

RESULTS: The five studies included 18 RFs. These were classified into six themes: sociodemographic, neurological, functional, clinical, biological and medical care management. RFs for both the general and

SCI-specific populations were similar, however, clinical, functional and hospital management emerged as specific RF domains for the SCI population.

CONCLUSION: We identified SCI-specific RFs for the development and recurrence of PUs. However, these findings are based on a small number of studies; highlighting the need for further confirmatory work to reduce PU development and recurrence, and provide a foundation for SCI risk assessment development.

36

Michel JM, Willebois S, Ribinik P, Barrois B, Colin D and Passadori Y. As of 2012, what are the key predictive risk factors for pressure ulcers? Developing French guidelines for clinical practice. Annals of Physical & Rehabilitation Medicine. 2012;55(7):454-65.

INTRODUCTION: An evaluation of predictive risk factors for pressure ulcers is essential in development of a preventive strategy on admission to hospitals and/or nursing homes.

OBJECTIVES: Identification of the predictive factors for pressure ulcers as of 2012.

METHOD: Systematic review of the literature querying the databases PASCAL Biomed, Cochrane Library and PubMed from 2000 through 2010.

RESULTS: Immobility should be considered as a predictive risk factor for pressure ulcers (grade B).

Undernutrition/malnutrition may also be a predictive risk factor for pressure ulcers (grade C).

DISCUSSION: Even if the level of evidence is low, once these risk factors have been detected, management is essential. Sensitizing and mobilizing health care teams requires training in ways of tracking and screening. According to the experts, risk scales should be used. As decision aids, they should always be balanced and complemented by the clinical judgment of the treatment team.

CONCLUSION: According to experts, it is important to know and predictively evaluate risk of pressure ulcers at the time of hospital admission. The predictive risk factors found in this study are identical to those highlighted at the 2001 consensus conference of which was PERSE was the promoter. Copyright © 2012. Published by Elsevier Masson SAS.

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Moore Z, Johansen E and van Etten M. A review of PU risk assessment and prevention in Scandinavia, Iceland and Ireland (part II). Journal of Wound Care. 2013;22(8):423-4, 426-8, 430-1.

OBJECTIVE: To provide a critical appraisal of nurses risk assessment and pressure ulcer (PU) preventive practices across Scandinavia, Iceland and Ireland.

METHOD: An integrative research review following Cooper's five stages. Studies published in peer-reviewed journals, involving any study design, but specifically exploring PU risk assessment or preventative practices, in any care setting, were included.

RESULTS: Risk assessment practice was primarily investigated in the acute care setting and was found to be irregular, based on both numeric scales and clinical judgments. This irregular practice means that some vulnerable patients are not screened for pressure ulcer risk, conversely, when risk assessed, a care plan is not necessarily provided. A significant gap in nurse documentation, together with a lack of supporting evidence for repositioning and use of appropriate redistribution devices was also identified, indicating a lack of a standardised approach to pressure ulcer prevention.

CONCLUSION: Despite an abundance of literature exploring this subject, it is clear that current practice in pressure ulcer prevention is not embedded within best practice recommendations. Therefore, to address the potential patient safety implications, clinical practice could benefit from exploration and identification of practical methods for improving actual pressure ulcer preventive practice.

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National Guideline Clearinghouse (NGC). Guideline synthesis: Prevention of Pressure Ulcers 2014 [cited 2016 Feb 09]; Available from: <http://www.guideline.gov/syntheses/synthesis.aspx?f=rss&id=47794>

5

National Institute for Health and Care Excellence. Pressure ulcers: prevention and management. 2014 [cited 2016 Feb 09]; Available from: <http://www.nice.org.uk/guidance/cg179>

4

National Institute for Health and Care Excellence. Pressure ulcers. 2015 [cited 2016 Feb 09]; Available from: <http://www.nice.org.uk/guidance/qs89>

6

National Institute for Health and Care Excellence. Pressure ulcers overview. 2016 [cited 2016 Feb 09]; Available from: <http://pathways.nice.org.uk/pathways/pressure-ulcers>

13

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention of pressure ulcers. 2014 [cited 2016 Feb 09]; Available from: <http://www.guideline.gov/content.aspx?id=48864>

56

NHS Improving Quality. Pressure ulcers: resources 2016 [cited 2016 Feb 11]; Available from: <http://www.nhs.uk/quality-improvement/pressure-ulcers/resources.aspx>

1

NHS Wales. Programme Maintenance Area: Preventing Hospital Acquired Pressure Ulcers. 2013 [cited 2015 Oct 20]; Available from: <http://www.1000livesplus.wales.nhs.uk/prog-area-pressure-ulcers>
<http://www.1000livesplus.wales.nhs.uk/pressure-ulcers>

41

Niederhauser A, VanDeusen Lukas C, Parker V, Ayello EA, Zulkowski K and Berlowitz D. Comprehensive programs for preventing pressure ulcers: a review of the literature. *Advances in Skin & Wound Care*. 2012;25(4):167-88; quiz 189-90.

OBJECTIVE: The objective of this study was to examine the evidence supporting the combined use of interventions to prevent pressure ulcers (PrUs) in acute care and long-term-care facilities.

DESIGN: A systematic review of the literature describing multifaceted PrU prevention programs was performed. Articles were included if they described an intervention implemented in acute care settings or long-term-care facilities, incorporated more than 1 intervention component, involved a multidisciplinary team, and included information about outcomes related to the intervention.

MAIN RESULTS: Twenty-four studies were identified. Recurring components used in the development and implementation of PrU prevention programs included preparations prior to the start of a program, PrU prevention best practices, staff education, clinical monitoring and feedback, skin care champions, and cues to action. Ten studies reported PrU prevalence rates; 9 of them reported decreased prevalence rates at the end of their programs. Of the 6 studies reporting PrU incidence rates, 5 reported a decrease in incidence rates. Four studies measured care processes: 1 study reported an overall improvement; 2 studies reported improvement on some, but not all, measures; and 1 study reported no change.

CONCLUSIONS: There is a growing literature describing multipronged, multidisciplinary interventions to prevent PrUs in acute care settings and long-term-care facilities. Outcomes reported in these studies

suggest that such programs can be successful in reducing PrU prevalence or incidence rates. However, to strengthen the level of evidence, sites should be encouraged to rigorously evaluate their programs and to publish their results.

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O'Connell Tuathail C and Taqi R. Evaluation of three commonly used pressure ulcer risk assessment scales. *British Journal of Nursing*. 2011;20(S27-34 1p.

Pressure ulcers are a huge concern for health professionals, cause suffering to patients and are associated with increased morbidity. Aim: This literature review provides an overview of the literature on the three most commonly used pressure ulcer risk assessment scales - the Waterlow scale, the Braden scale and the Norton scale. Method: A search was undertaken through the databases CINAHL, MEDLINE, British Nursing Index, ProQuest and Cochrane Library. Key terms included pressure ulcers, pressure sores, risk assessment, Braden scale, Norton scale and Waterlow scale. Results: While risk assessment scales are beneficial they should not be used without the aid of nurses' clinical judgment. Over-predicting pressure ulcers is a common problem when using risk assessment scales. However, ethical considerations preclude investigation into the predictive capacity of a scale. Ongoing education in the prevention and management of pressure ulcers is essential for nurses. Risk assessment scales should be adapted to suit the needs of the clinical setting in which they are used. Conclusion: The Waterlow scale is the most widely used risk assessment scale in the UK and Ireland, even though there is no evidence to suggest it is more effective than the other most commonly used scales.

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Ontario Health Technology Advisory Committee (OHTAC). Turning for the Prevention and Management of Pressure Ulcers: OHTAC recommendation. 2014 [cited 2016 Feb 09]; Available from: <http://www.hqontario.ca/Portals/0/Documents/eds/ohatas/recommendation-turn-1410-en.pdf>

55

Page KN, Barker AL and Kamar J. Development and validation of a pressure ulcer risk assessment tool for acute hospital patients. *Wound Repair Regen*. 2011;19(1):31-7.

The purpose of this study was to develop and validate a pressure ulcer risk assessment for acute hospitals. This tool was developed in a cohort of 342 patients with a mean age 63 years (SD 19.82) and validated in a second cohort of 165 patients with a mean age 68 years (SD 18.40). Risk factors for inclusion on The Northern Hospital Pressure Ulcer Prevention Plan (TNH-PUPP) were identified from the literature then examined and weighted using logistic regression. Risk factors included on the TNH-PUPP were requires assistance to move in bed (odds ratio [OR] 5.15; 95% confidence interval [CI]: 2.49-10.65), admission to intensive care during current admission (OR 2.98; 95% CI: 1.33-6.67), aged \geq 65 years (OR 2.81; 95% CI: 1.24-6.36), reduced sensation (OR 2.29; 95% CI: 1.19-4.42), and cognitive impairment (OR 2.26; 95% CI: 1.09-4.67). The TNH-PUPP was validated in a prospective sample. The new tool had high diagnostic validity (area under the receiver operating curve=0.86), consistent in the validation sample (area under the receiver operating curve=0.90). The TNH-PUPP has a moderate positive predictive value (development=0.50; validation=0.13), and a high negative predictive value (development=0.94; validation=0.99) enabling low-risk patients to be screened out, as noncandidates for pressure ulcer prevention interventions. An accurate pressure ulcer risk assessment has been developed and validated, which identifies a high-risk group to whom limited pressure ulcer prevention resources should be directed. The TNH-PUPP facilitates effective resource allocation and is likely to reduce unnecessary patient harm and costs from pressure ulcers in acute hospitals.

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Paul R, Paris McCutcheon S, Tregarthen JP, Thayer Denend L and Zenios SA. Sustaining Pressure Ulcer Best Practices in a High-Volume Cardiac Care Environment. American Journal of Nursing. 2014;114(8):34-46 13p.

Narayana Hrudayalaya Cardiac Hospital (NHCH) in Bangalore, India (now known as the Narayana Institute of Cardiac Sciences), is one of the world's largest and busiest cardiac hospitals. In early 2009, NHCH experienced a sharp increase in the number of surgical procedures performed and a corresponding rise in hospital-acquired pressure ulcers. The hospital sought to reduce pressure ulcer prevalence by implementing a portfolio of quality improvement strategies. Baseline data showed that, over the five-month observation period, an average of 6% of all adult and pediatric surgical patients experienced a pressure ulcer while recovering in the NHCH intensive therapy unit (ITU). Phase 1 implementation efforts, which began in January 2010, focused on four areas: raising awareness, increasing education, improving documentation and communication, and implementing various preventive practices. Phase 2 implementation efforts, which began the following month, focused on changing operating room practices. The primary outcome measure was the weekly percentage of ITU patients with pressure ulcers. By July 2010, that percentage was reduced to zero; as of April 1, 2014, the hospital has maintained this result. Elements that contributed significantly to the program's success and sustainability include strong leadership, nurse and physician involvement, an emphasis on personal responsibility, improved documentation and communication, ongoing training and support, and a portfolio of low-tech changes to core workflows and behaviors. Many of these elements are applicable to U.S. acute care environments.

14

Qaseem A, Humphrey LL, Forcica MA, Starkey M and Denberg TD. Treatment of pressure ulcers: a clinical practice guideline from the American College of Physicians. Ann Intern Med. 2015;162(5):370-9.

DESCRIPTION: The American College of Physicians (ACP) developed this guideline to present the evidence and provide clinical recommendations based on the comparative effectiveness of treatments of pressure ulcers. METHODS: This guideline is based on published literature on this topic that was identified by using MEDLINE, EMBASE, CINAHL, EBM Reviews, the Cochrane Central Register of Controlled Trials, the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects, and the Health Technology Assessment database through February 2014. Searches were limited to English-language publications. The outcomes evaluated for this guideline include complete wound healing, wound size (surface area, volume, and depth) reduction, pain, prevention of sepsis, prevention of osteomyelitis, recurrence rate, and harms of treatment (including but not limited to pain, dermatologic complications, bleeding, and infection). This guideline grades the quality of evidence and strength of recommendations by using ACP's clinical practice guidelines grading system. The target audience for this guideline includes all clinicians, and the target patient population is patients with pressure ulcers. RECOMMENDATION 1: ACP recommends that clinicians use protein or amino acid supplementation in patients with pressure ulcers to reduce wound size. (Grade: weak recommendation, low-quality evidence). RECOMMENDATION 2: ACP recommends that clinicians use hydrocolloid or foam dressings in patients with pressure ulcers to reduce wound size. (Grade: weak recommendation, low-quality evidence). RECOMMENDATION 3: ACP recommends that clinicians use electrical stimulation as adjunctive therapy in patients with pressure ulcers to accelerate wound healing. (Grade: weak recommendation, moderate-quality evidence).

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Qaseem A, Mir TP, Starkey M and Denberg TD. Risk Assessment and Prevention of Pressure Ulcers: A Clinical Practice Guideline From the American College of Physicians. *Annals of Internal Medicine*. 2015;162(5):359-369.

Description: The American College of Physicians (ACP) developed this guideline to present the evidence and provide clinical recommendations based on the comparative effectiveness of risk assessment scales and preventive interventions for pressure ulcers. Methods: This guideline is based on published literature on this topic that was identified by using MEDLINE (1946 through February 2014), CINAHL (1998 through February 2014), the Cochrane Library, clinical trials registries, and reference lists. Searches were limited to English-language publications. The outcomes evaluated for this guideline include pressure ulcer incidence and severity, resource use, diagnostic accuracy, measures of risk, and harms. This guideline grades the quality of evidence and strength of recommendations by using ACP's clinical practice guidelines grading system. The target audience for this guideline includes all clinicians, and the target patient population is patients at risk for pressure ulcers. Recommendation 1: ACP recommends that clinicians should perform a risk assessment to identify patients who are at risk of developing pressure ulcers. (Grade: weak recommendation, low-quality evidence) Recommendation 2: ACP recommends that clinicians should choose advanced static mattresses or advanced static overlays in patients who are at an increased risk of developing pressure ulcers. (Grade: strong recommendation, moderate-quality evidence) Recommendation 3: ACP recommends against using alternating-air mattresses or alternating-air overlays in patients who are at an increased risk of developing pressure ulcers. (Grade: weak recommendation, moderate-quality evidence)

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Registered Nurses' Association of Ontario (RNAO). Risk assessment & prevention of pressure ulcers. 2011 [cited 2016 Feb 09]; Available from: <http://www.guideline.gov/content.aspx?id=34754>

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Saha S, Smith MEB, Totten A, Fu R, Wasson N, Rahman B and et al. Pressure ulcer treatment strategies: comparative effectiveness. . 2013 [cited 2016 Feb 10]; Available from: <http://www.effectivehealthcare.ahrq.gov/ehc/products/308/1491/pressure-ulcer-treatment-report-130508.pdf>

51

Samuriwo R. Pressure ulcer prevention: the role of the multidisciplinary team. *British Journal of Nursing*. 2012;S4-S13 1p.

Pressure ulcer prevention has long been a priority for health professionals; however, poor pressure-ulcer-related practices like poor documentation continue to be identified. Research has shown that the attitude and behaviour of some nurses towards pressure ulcer prevention are not conducive to the best possible patient outcomes. This article reviews the findings of a Straussian grounded theory study, which sought to ascertain the value that is placed on pressure ulcer prevention by nurses, but also revealed the role that other health professionals in the multidisciplinary team play in the maintenance of skin integrity. The findings of this study which are presented in this paper highlight a number of important issues. Firstly, nurses are expected to know how to prevent and manage pressure ulcers, but in reality they are very reliant on the advice and support of other health professionals to maintain their patients' skin integrity. In addition, the level of support that nurses get from other health professionals in the multidisciplinary varies tremendously. Therefore, nurses in clinical practice need to be proactive in seeking input from other health professionals, as there are many members of the multidisciplinary team who are able to give them the advice and support that they need in prevention and management.

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Soban LM, Hempel S, Munjas BA, Miles J and Rubenstein LV. Preventing pressure ulcers in hospitals: A systematic review of nurse-focused quality improvement interventions. *Joint Commission Journal on Quality & Patient Safety*. 2011;37(6):245-52.

BACKGROUND: A systematic review of the literature on nurse-focused interventions conducted in the hospital setting informs the evidence base for implementation of pressure ulcer (PU) prevention programs. Despite the availability of published guidelines, there is little evidence about which interventions can be successfully integrated into routine care through quality improvement (QI). The two previous literature syntheses on PU prevention have included articles from multiple settings but have not focused specifically on QI.

METHODS: A search of six electronic databases for publications from January 1990 to September 2009 was conducted. Trial registries and bibliographies of retrieved studies and reviews, and Internet sites of funding agencies were also searched. Using standardized forms, two independent reviewers screened publications for eligibility into the sample; data were abstracted and study quality was assessed for those that passed screening.

FINDINGS: Thirty-nine studies met the inclusion criteria. Most of them used a before-and-after study design in a single site. Intervention strategies included PU-specific changes in combination with educational and/or QI strategies. Most studies reported patient outcome measures, while fewer reported nursing process of care measures. For nearly all the studies, the authors concluded that the intervention had a positive effect. The pooled risk difference for developing PUs was $-.07$ (95% confidence interval [CI]: $-0.0976, -0.0418$) comparing the pre- and postintervention status.

CONCLUSION: Future research can build the evidence base for implementation through an increased emphasis on understanding the mechanisms by which improved outcomes are achieved and describing the conditions under which specific intervention strategies are likely to succeed or fail.

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Sullivan N and Schoelles KM. Preventing in-facility pressure ulcers as a patient safety strategy: a systematic review. *Ann Intern Med*. 2013;158(5 Pt 2):410-6.

Complications from hospital-acquired pressure ulcers cause 60,000 deaths and significant morbidity annually in the United States. The objective of this systematic review is to review evidence regarding multicomponent strategies for preventing pressure ulcers and to examine the importance of contextual aspects of programs that aim to reduce facility-acquired pressure ulcers. CINAHL, the Cochrane Library, EMBASE, MEDLINE, and PreMEDLINE were searched for articles published from 2000 to 2012. Studies (any design) that implemented multicomponent initiatives to prevent pressure ulcers in adults in U.S. acute and long-term care settings and that reported pressure ulcer rates at least 6 months after implementation were selected. Two reviewers extracted study data and rated quality of evidence. Findings from 26 implementation studies (moderate strength of evidence) suggested that the integration of several core components improved processes of care and reduced pressure ulcer rates. Key components included the simplification and standardization of pressure ulcer-specific interventions and documentation, involvement of multidisciplinary teams and leadership, use of designated skin champions, ongoing staff education, and sustained audit and feedback.

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Thomas DR. Role of nutrition in the treatment and prevention of pressure ulcers. *Nutrition in Clinical Practice*. 2014;29(4):466-472.

Undernutrition has been associated with pressure ulcers in epidemiological studies over several decades. Accumulating evidence from recent systematic reviews and randomized controlled trials has shown that nutrition therapy has only modest effects on prevention and treatment of pressure ulcers.

Since undernutrition should be responsive to the provision of adequate nutrients, the poor response suggests a different nutrition construct is required. Weight loss and changes in acute inflammatory reactants may reflect the syndrome of cachexia rather than simple undernutrition. Nutrition prescriptions should be individually tailored to persons with pressure ulcers with regard to both macro- and micronutrients. This review evaluates effects of malnutrition on pressure ulcers and analyzes effects of nutrition on pressure ulcer prevention and healing. © 2014 American Society.

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Ullah N and Alam I. Nutritional care of patients with pressure ulcers: Some evidence based guidelines. Pakistan Journal of Medical Sciences. 2012;28(1):196-200.

Malnutrition has been shown to be a significant factor in the development and deterioration of pressure ulcers (PU). However, whether nutritional intervention can be effective in the treatment of PU is still unclear and controversial mainly due to inconsistent results reported in some recent studies. The objective of this review is to evaluate the effectiveness of nutritional care in patients with PU. The review is expected to comprehend the definition, prevalence and effectiveness of nutritional care on the prevention and treatment of PU. In addition a discussion on the level of adequacy of nutritional care and the role of enteral and parenteral nutrition on the prevention and treatment of PU is also provided. Sources of Data/Study selection: Data from survey reports, health statistics, descriptive, cross-sectional and longitudinal studies published between 1990-2008 on the topic were included. Data searches concentrated on human studies only excluding those with irrelevant and incomplete conclusions. Data Extraction: The literature was accessed using data bases and abstracting systems including Medline, PubMed, Science Direct, Research GATE, etc. The prevalence of PU may range from 5-50%. Nutritional status is an independent risk factor for the development of pressure ulcers. Data from nutrition supplementation studies show faster recovery from PU and lesser hospital stay. Diets with high energy and protein, supplemented with vitamins, minerals and immunomodulators are generally indicated in PU. Enteral and parenteral nutrition are indicated when the patient fails to achieve nutritional needs through oral route and are recommended to be used without any contraindications.

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Wounds UK. Eliminating pressure ulcers. 2013 [cited 2016 Feb 09]; Available from: http://www.wounds-uk.com/pdf/content_10815.pdf